CLAIMS

We claim:

1. An integrated lead suspension assembly for supporting a slider in a magnetic storage system, comprising:

a load beam, the load beam having a longitudinal, generally flat structure;

a limiter having a free end extending from a fixed end from the load beam, the limiter is bendable from a first position in which the free end is substantially in a plane of the load beam, to a second position in which the free end is substantially out of the plane of the load beam; and

a flexure assembly comprising a longitudinal, generally flat flexible member and conductive leads formed thereon, a first section of the flexible member being fixedly attached to the load beam, and a second section of the flexible member defining a slider mounting section for supporting a slider and an aperture that is sized and positioned such the limiter is free to be bent from the first position to the second position and extend through the aperture after the flexure assembly has been attached to the load beam.

2. An integrated lead suspension assembly as in claim 1, wherein the free end of the limiter extends towards the first section of the flexible member.

3. An integrated lead suspension assembly as in claim 2, wherein the aperture is located in the second section of the flexible member between the first section and the slider mounting section.

4. An integrated lead suspension assembly as in claim 2, wherein the aperture is located in the second section of the flexible member at a leading edge side of a slider to be placed into operation.

5. An integrated lead suspension assembly as in claim 4, wherein the flexible member defines a stop that interacts with the limiter in its second position such that movement of the flexible member away from the load beam is limited by catching the limiter by the stop.

6. An integrated lead suspension assembly as in claim 5, wherein the stop comprises a hook member defined in the aperture, positioned and sized to catch the limiter in its second position.

7. An integrated lead suspension assembly as in claim 1, wherein the flexible member is substantially free of permanent bending in its substantially flat structure.

8. An integrated lead suspension assembly as in claim 2, further comprising a pivoting means for pivoting gimbal motion of the slider mounting section, wherein the aperture in the flexible member is between the pivoting means and the first section of the flexible member.

9. An integrated lead suspension assembly as in claim 1, wherein the conductive leads terminate in terminal pads at one end adjacent the slider mounting section such that the

solder pads can be connected to terminals on a slider supported on the slider mounting section, wherein the terminal pads are not supported by the flexible member.

10. An integrated lead suspension assembly as in claim 9, wherein the flexible member defines openings adjacent the slider mounting section, wherein the terminal pads are located above the openings.

11. An integrated lead suspension assembly as in claim 10, wherein the flexure assembly further comprises an insulation layer between the conductive leads and the flexible member; wherein the insulation layer extends below the terminal pads but covering an area smaller than the terminal pads.

12. An integrated lead suspension assembly as in claim 11, wherein the insulation layer covers an area that does not extend to the edges of the terminal pads.

13. An integrated lead suspension assembly as in claim 12, wherein the terminal pads are sized and positioned to allow solder ball bonding of the terminal pads to the terminals on the slider.

14. An integrated lead suspension assembly as in claim 1, wherein the load beam further comprises a tab extending from a distal end of the load beam beyond the slider mounting section, the tab having a curve surface for interacting with an external cam surface for slider loading and unloading with respect to a parked position.

15. An integrated lead suspension assembly as in claim 14, wherein the second section of the flexible member extends over a tip region of the load beam, wherein the tip region is substantially same or narrower than the slider mounting section.

16. An integrated lead suspension assembly as in claim 1, wherein the load beam has low profile flanges along the longitude, generally flat structure that add structural rigidity to the load beam.

17. An integrated lead suspension assembly as in claim 16, wherein the flanges are at 30°- 60° to the plane of the load beam.

18. An integrated lead suspension assembly as in claim 17, wherein the flanges are at 45° to the plane of the load beam.

19. An integrated lead suspension assembly as in claim 1, wherein the load beam comprises at least a dimple protrusion near an edge of the load beam, on a same side as the flexure assembly and at a location where the load beam is not attached to or facing the flexible member, the dimple protrusion having a height taller than the flexure assembly, whereby the dimple protrusion facilitates insertion of a tool to maintain separation of an adjacent similar integrated lead suspension assembly.

20. An integrated lead suspension assembly as in claim 19, wherein the load beam comprises two dimple protrusions, each near an edge of the load beam, on either side of a section of the flexure assembly.

21. An integrated lead suspension assembly as in claim 1, wherein:

the load beam is pre-bent to define a hinge region,

the conductive leads includes read leads for read data and write leads for write data to and from the slider, and

the first section of the flexible member has a split section above the hinge region, supporting read leads on a first branch and write leads on a second branch of a different width.

22. An integrated lead suspension assembly as in claim 21, wherein the read leads are wider than the write leads and the first branch is wider than the second branch.

23. An integrated lead suspension assembly as in claim 22, wherein the overall perimeter of the split section is generally symmetrical with respect to a longitudinal axis.

24. A magnetic storage system, comprising:

a magnetic storage medium with a data surface of concentric data tracks;

a motor drive for rotating the magnetic storage medium;

a slider including a read/write transducer maintained in operative relationship with the data surface during relative rotation between the slider and the magnetic storage medium;

an actuator assembly coupled to the slider for pivotally positioning said slider relative to the magnetic storage medium to selected tracks on the data surface, the actuator assembly comprising an integrated lead suspension assembly that comprises:

(a) a load beam, the load beam having a longitudinal, generally flat structure;

(b) a limiter having a free end extending from a fixed end from the load beam, the limiter is bendable from a first position in which the free end is substantially in a plane of the load beam, to a second position in which the free end is substantially out of the plane of the load beam; and

(c) a flexure assembly comprising a longitudinal, generally flat flexible member and conductive leads formed thereon, a first section of the flexible member being fixedly attached to the load beam, and a second section of the flexible member defining a slider mounting section for supporting the slider and an aperture that is sized and positioned such the limiter is free to be bent from the first position to the second position and extend through the aperture after the flexure assembly has been attached to the load beam; and

a control unit for controlling the operations of the motor drive and actuator assembly and processing data read from and written to the data surface.

25. A method of making an integrated lead suspension assembly for supporting a slider in a magnetic storage system, comprising the steps of:

forming a load beam, the load beam having a longitudinal, generally flat structure;

forming a limiter having a free end extending from a fixed end from the load beam, the limiter is bendable from a first position in which the free end is substantially in a plane of the

load beam, to a second position in which the free end is substantially out of the plane of the load beam;

forming a flexure assembly comprising a longitudinal, generally flat flexible member and conductive leads thereon;

fixedly attaching the flexible member to the load beam at a first section of the flexible member;

defining at a second section of the flexible member a slider mounting section for supporting a slider and an aperture that is sized and positioned such that the limiter is free to be bent from the first position to the second position and extend through the aperture after the flexure assembly has been attached to the load beam; and

bending the limiter from the first position to the second position.

26. For a flexure assembly having a longitudinal, generally flat flexible member and conductive leads formed thereon, and a slider mounted at an end, a method of bonding conductive leads to the slider comprises the steps of:

providing openings adjacent the slider;

terminating the conductive leads in terminal pads at one end adjacent terminals on the slider and over the openings; and

reflowing a solder ball to bond the terminal pads to the terminals on the slider.

27. An integrated lead suspension assembly for supporting a slider in a magnetic storage system, comprising:

a load beam, the load beam having a longitudinal, generally flat structure;

a flexure assembly comprising a longitudinal, generally flat flexible member and conductive leads formed thereon, a first section of the flexible member being fixedly attached to the load beam, and a second section of the flexible member defining a slider mounting section for supporting a slider and an aperture located between the first section and the slider mounting section; and

a limiter having a free end extending out of the plane of the load beam, through the aperture in the flexible member and towards the first section.

28. An integrated lead suspension assembly for supporting a slider in a magnetic storage system, comprising:

a load beam, the load beam having a longitudinal, generally flat structure; and

a flexure assembly comprising a longitudinal, generally flat flexible member and conductive leads formed thereon, a first section of the flexible member being fixedly attached to the load beam, and a second section of the flexible member defining a slider mounting section for supporting a slider and openings adjacent the slider mounting section, wherein the conductive leads terminate in terminal pads at one end adjacent the slider mounting section and which terminal pads are located over the openings such that the solder pads can be connected to terminals on a slider supported on the slider mounting section by solder ball bonding.

29. An integrated lead suspension assembly for supporting a slider in a magnetic storage system, comprising:

a load beam, the load beam having a longitudinal, generally flat structure having a tip region at a distal end of the load beam, and comprises a tab extending from the distal end of the

load beam, wherein the tab has a curve surface for interacting with an external cam surface for slider loading and unloading with respect to a parked position; and

a flexure assembly comprising a longitudinal, generally flat flexible member and conductive leads formed thereon, a first section of the flexible member being fixedly attached to the load beam, and a second section of the flexible member defining a slider mounting section for supporting a slider, wherein the second section of the flexible member extends over the tip region of the load beam, and the slider mounting section is substantially same or wider than the tip region.